WHAT IS CLAIMED IS:

1. An acoustic monitoring method in laser-induced optical breakdown (LIOB), the method comprising the steps of:

causing at least one acoustic wave associated with a microbubble to propagate in a volume of material;

detecting the at least one acoustic wave to obtain at least one signal; and

processing the at least one signal to obtain information which characterizes the material, the microbubble in the material or a microenvironment of the microbubble.

2. The method as claimed in claim 1, the information characterizes the mechanical microenvironment of the microbubble.

3. The method as claimed in claim 2, wherein the information characterizes the viscoelasticity of the microenvironment.

4. The method as claimed in claim 1, wherein the information characterizes microbubble size.

5. The method as claimed in claim 1, wherein the at least one acoustic wave includes at least one acoustic wave reflected from the microbubble.

6. The method as claimed in claim 5, wherein the at least one reflected acoustic wave includes an ultrasound wave.

7. The method as claimed in claim 1, wherein the at least one acoustic wave includes an acoustic shock wave which propagates outwardly from an LIBO site and defines an acoustic point source.

8. The method as claimed in claim 7, wherein the microbubble is LIOB-induced and wherein the acoustic shock wave defines position of the LIOB-induced microbubble which acts as an acoustic reflector.

9. The method as claimed in claim 7, wherein the point source is determined by location of an additive in the material and wherein the additive enhances an electric field in the vicinity of the additive.

10. The method as claimed in claim 9, wherein the information characterizes a photodisruption threshold of the material with the additive which is substantially lower than a photodisruption threshold of the material without the additive.

11. The method as claimed in claim 10, wherein the information quantifies concentration of the additive.

12. The method as claimed in claim 11, wherein a single molecule of the additive is detected.

13. The method as claimed in claim 9, wherein the material includes at least one nanodevice having the additive and a linked therapeutic agent and wherein at least one laser pulse causes the at least one nanodevice to release the linked therapeutic agent into the microenvironment.

14. The method as claimed in claim 13, wherein the information characterizes therapeutic efficacy of the therapeutic agent in the microenvironment.

15. The method as claimed in claim 7, wherein the material has an additive incorporated therein and wherein the point source is a desired point source substantially smaller than a point source defined by a microbubble created within the material without the additive.

16. The method as claimed in claim 15, wherein the additive includes metal nano particles or domains.

17. The method as claimed in claim 1, wherein the microbubble is produced by at least one laser pulse.

18. The method as claimed in claim 17, wherein the at least one laser pulse includes a focused laser pulse.

19. The method as claimed in claim 1, wherein the microbubble is produced by at least one ultrafast laser pulse.

20. The method as claimed in claim 19, wherein the information characterizes a photodisruption threshold of the material.

21. The method as claimed in claim 1, wherein the information characterizes location of the microbubble within the material.

22. The method as claimed in claim 1, wherein the information characterizes microbubble behavior in the material.

23. The method as claimed in claim 4, wherein microbubble size is determined using non-linear acoustic scattering from the microbubble.

24. The method as claimed in claim 1, wherein the material includes a liquid or semi-liquid material, such as biological tissue.

25. An acoustic monitoring system in laser-induced optical breakdown (LIOB), the system comprising:

means for causing at least one acoustic wave associated with a microbubble to propagate in a volume of material;

an acoustic wave detector for detecting the at least one acoustic wave to obtain at least one signal; and

means for processing the at least one signal to obtain information which characterizes the material, the microbubble in the material or a microenvironment of the microbubble.

26. The system as claimed in claim 25, the information characterizes the mechanical microenvironment of the microbubble.

27. The system as claimed in claim 26, wherein the information characterizes the viscoelasticity of the microenvironment.

28. The system as claimed in claim 25, wherein the information characterizes microbubble size.

29. The system as claimed in claim 25, wherein the at least one acoustic wave includes at least one acoustic wave reflected from the microbubble and wherein the means for causing includes an acoustic source for directing acoustic energy to the material so that at least one acoustic wave propagates through the material to the microbubble to obtain the at least one reflected acoustic wave.

30. The system as claimed in claim 29, wherein the at least one reflected acoustic wave includes an ultrasound wave.

31. The system as claimed in claim 25, wherein the at least one acoustic wave includes an acoustic shock wave which propagates outwardly from an LIOB site and which defines an acoustic point source.

32. The system as claimed in claim 31, wherein the microbubble is LIOB-induced and wherein the acoustic shock wave defines position of the LIOB-induced microbubble which acts as an acoustic reflector.

33. The system as claimed in claim 31, wherein the point source is determined by location of an additive in the material and wherein the additive enhances an electric field in the vicinity of the additive.

34. The system as claimed in claim 33, wherein the information characterizes a photodisruption threshold of the material with the additive which is substantially lower than a photodisruption threshold of the material without the additive.

35. The system as claimed in claim 34, wherein the information quantifies concentration of the additive.

36. The system as claimed in claim 35, wherein a single molecule of the additive is detected.

37. The system as claimed in claim 33, wherein the material includes at least one nanodevice having the additive and a linked therapeutic agent and wherein at least one laser pulse causes the at least one nanodevice to release the linked therapeutic agent into the microenvironment.

38. The system as claimed in claim 37, wherein the information characterizes therapeutic efficacy of the therapeutic agent in the microenvironment.

39. The system as claimed in claim 31, wherein the material has an additive incorporated therein and wherein the point source is a desired point source substantially smaller than a point source defined by a microbubble created within the material without the additive.

40. The system as claimed in claim 39, wherein the additive includes metal nano particles or domains.

41. The system as claimed in claim 25, wherein the microbubble is produced by at least one laser pulse.

42. The system as claimed in claim 41, wherein the at least one laser pulse includes a focused laser pulse.

43. The system as claimed in claim 25, wherein the microbubble is produced by at least one ultrafast laser pulse.

44. The system as claimed in claim 43, wherein the information characterizes a photodisruption threshold of the material.

45. The system as claimed in claim 25, wherein the information characterizes location of the microbubble within the material.

46. The system as claimed in claim 25, wherein the information characterizes microbubble behavior in the material.

47. The system as claimed in claim 28, wherein the microbubble size is determined using non-linear scattering from the microbubble.

48. The system as claimed in claim 25, wherein the material includes a liquid or semi-liquid material, such as biological tissue.

49. The method as claimed in claim 1, wherein the information includes an acoustic image of the material.

50. The method as claimed in claim 7, further comprising time reversing the acoustic shock wave to form an acoustic image of the material.

51. The system as claimed in claim 25, wherein the information includes an acoustic image of the material.

52. The system as claimed in claim 31, further comprising means for time reversing the acoustic shock wave to form an acoustic image of the material.